Chair

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to chairs. More specifically, the present invention relates to chairs comprising a seat and a base connected by a cantilever arm such that the seat is attached to the projecting end of the cantilever arm. More specifically, the present invention relates to chairs wherein the projecting end of the cantilever arm may be displaced relative to the base and rotated about the base.

DESCRIPTION OF THE PRIOR ART

Many professions demand that the practitioners stand while practising their trades for lack of a better reason than a suitable chair has not been developed. For example, professionals in the health care field such as surgeons or dentists must stand next to the operating table or dental chair and bend over the patient for long periods of time in uncomfortable positions, which are not only uncomfortable, but may result in back injury.

In some situations, such as the dental field, an alternative to standing is the use of stools. Although attempts have been made to improve the stool, there remain many drawbacks to the stools in use today. Many professions demand that the work angle be adjusted frequently, such as in dentistry wherein a dentist or their assistant may need to move from one angle to another to reach an area in the patient's mouth. In order to reposition the stool, the professional may move the stool by grasping it with his hand, which may compromise the sterile field.

To allow ease of movement, the stool may be placed on wheels. However, a wheeled stool may then slip if the professional is seated and executing a maneuver that requires the

exertion of force, such as pulling a tooth. Finally, stools may not be a steady work platform, especially if the professional is required to lean forward while performing a maneuver.

A seat that can be positioned into a variety of different locations quickly and easily may be advantageous in aiding such professionals practice their profession.

The prior art teaches chairs which may be positioned into a variety of locations. However, such chairs lack many of the characteristics required by the medical professionals. One such example is U.S. Patent No. 4,400,032, which teaches a chair wherein a horizontally positioned telescoping arm connects a seat to a base. One end of the arm is connected to the base such that the arm has a vertical axis of rotation. The opposite end of the arm is connected to a seat. The seat may also rotate about a vertical axis at the end of the arm, and the height of the seat is adjustable. The '032 patent teaches that the seat is supported by a ball bearing which rolls across the floor. With this arrangement, the rolling ball may travel through fluids spilled on the floor and thus may, in a medical environment, spread contamination. Also, the rolling ball may be entangled by electrical cords or water hoses, thereby inhibiting the movement of the chair. Moreover, the '032 patent does not teach a method of securing the chair in a desired position, thereby leaving the professional to secure the chair.

U.S. Patent No. 4,181,281 teaches a chair wherein a horizontally positioned articulating arm connects a seat to a base. One end of the arm is connected to the base such that the arm has a vertical axis of rotation. A seat is located at the opposite end of the arm and is fully supported by the arm. The seat has a vertical axis of rotation, and the height of the seat may be adjusted. The ability to rotate the arm about the base and the seat on the arm, coupled with the articulated arm, allows the chair of the '281 patent to be positioned in a variety of different locations. However, the seat floats and accordingly the professional is still required to secure the chair.

It is an object of the present invention to obviate or mitigate at least some of the above-presented disadvantages.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a chair comprising a base and an extendable cantilever arm pivotally connected to the base. The cantilever arm has a first end projecting from the base. The first end is displaceable from the base by extension or retraction of the extendable cantilever arm, and the first end is rotatable about the base by the pivotal connection of the cantilever arm to the base. A seat is attached to the first end of the cantilever arm. A brake releasably inhibits displacement and rotation of the first end of the cantilever arm relative to the base.

According to a further aspect of the present invention, there is provided a chair comprising a base secured to a ground surface and leveled by a leveler. A telescopically extendable cantilever arm is pivotally connected to the base, the cantilever arm having a first end projecting from the base. The telescopic cantilever arm consists of two members and a stop to inhibit telescopic movement of the two members beyond a predetermined maximum extension. The first end is displaceable from said base by telescopic extension of the arm and the first end is rotatable about the base by the pivotal connection of the cantilever arm to the base. A seat is pivotally attached to the first end of the cantilever arm, the seat being height adjustable and including a back support and a removable knee support. A brake extends from the first end of the cantilever arm and contacts the ground surface such that contact with the ground surface inhibits rotational and telescopic movement of the cantilever arm relative to the base. Preferably, the brake is connected to the seat such that tilting the seat results in the brake extending to contact the ground surface.

According to a further aspect of the invention, there is provided a leveler for distancing and securing a base to a supportive surface, the leveler comprising a first, internally threaded, sleeve-like female member. A second, externally threaded, tubular male member having a shoulder for supporting the base. The second threaded male member mates with the first threaded female member and is rotatable relative to the first threaded member such that rotation of the second member results in the second threaded member being axially displaced with

respect to the first threaded member. A third member secures the base to the second member such that the second member remains rotatable when secured to the base by the third member.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a chair.

Figure 2 is an exploded view of a base assembly shown in figure 1.

Figure 3 is an exploded view of one section of an arm of figure 1.

Figure 4 is an exploded view of another section of the arm of figure 1.

Figure 5 is an exploded view of components of the seat assembly shown in figure 1.

Figure 6 is a cross sectional view of a leveler of figure 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference numerals designate identical or corresponding parts throughout the several views, and particularly to Figure 1 which depicts a chair comprising a base 4 secured to a floor 20 supporting a cantilever arm 6. The cantilever arm 6 has an inner end 7 that is attached to the base 4 by a pivotal connection 8 and a suspended end 10 that is slidable within the inner end 7. The arm 6 is rotatable about the base 4 and the suspended end 10 of the arm 6 is extendable relative to the base 4.

A seat assembly 12 is attached to the suspended end 10 of the arm 6, and is rotatable and vertically adjustable relative to the arm 6. An operator may move the seat assembly 12 into a variety of different locations laterally and radially relative to the base 4. The seat assembly 12 may be positioned while the operator is seated in the seat 12, or the operator may stand to move the seat assembly 12. Once the seat assembly 12 is at a desired location, a brake 14 is engaged which cooperates with the floor 20 to inhibit lateral and rotational movement of the cantilever

arm 6. The brake 14 secures the seat assembly 12 to allow the operator to perform tasks that may require the exertion of force from a seated position.

The base 4 includes a plate 24 secured to the floor 20 by a series of bolts 26 received in holes 48 positioned at the corners of the plate 24. To ensure that the arm 6 is horizontal, the base 4 is leveled and secured by four levelers 26, each of which is positioned at a corner of the base 4. Each of the levelers 26 consists of three interconnected bolts 30, 40, 50 shown in greater detail in figures 2 and 6. A first bolt 30 is a sleeve 31 having an exterior surface 34 that is threaded, thereby allowing the first bolt 30 to be secured into the floor 20.

The sleeve 31 has a threaded interior surface 32 for receiving the second bolt 40. The second bolt 40 has a threaded exterior 42 that is complementary to the threaded surface 32 of the first bolt 30. Due to the threaded mating of the first bolt 30 with the second bolt 40, rotation of the second bolt 40 relative to the first bolt 30 results in axial displacement of the second bolt 40 in relation to the first bolt 30. The second bolt 40 has a shoulder 44 at the top for engagement with the underside of the base 4. In the present embodiment, the shoulder 44 is hexagonal so that is may also be used to attach a tool such as a wrench to rotate the second bolt 40.

The second bolt 40 has a threaded inner surface 46 in the head 44 to provide a threaded surface for receiving a third bolt 50. The threaded opening 46 in the second bolt 40 may extend through the second bolt 40, or terminate within the second bolt 40. The third bolt 50 is threaded on the exterior 52 and is mated with the threaded opening 46 in the head 44 of the second bolt 40.

To mount the base 4 onto the leveler 26, the first bolts 30 are secured into the floor 20. The second bolts 40 are then engaged with the first bolts 30 and rotated until the second bolts 40 are retracted into the first bolts 30. The base 4 is then placed on the shoulders 44 of the second bolts 40 and holes 48 through the base 4 are aligned with the openings 46 in the heads 44 of the second bolts 40. The third bolts 50 are inserted into the holes 48 in the base 4 and threaded into

the opening 46 in the head 44 of the second bolt 40, thereby securing the base 4 to the second bolt 40. The base 4 may be leveled by rotation of the second bolts 40 at the corners of the base 4 to extend or retract the second bolts 40 and thus raise or lower the corners of the base 4. The third bolt 50 may remain in position securing the base 4 to the second bolts 40 while be base 4 being leveled, although the third bolt 50 may be loosened to allow rotation of the second bolts 40. Once the base 4 is leveled, the third bolts 50 are tightened to firmly secured the base 4 and the second bolt 40.

The cantilever arm 6 of the chair 1 is attached to the base 4 by a pivotal connection 8. In the present embodiment as best seen in figure 2, the pivotal connection 8 consists of a central shaft 53 fastened to the base 4. The lower end of the central shaft 53 is threaded and is received in a threaded hole 55 in the base 4. Alternatively, the central shaft 53 may be welded or bolted to the base 4. The central shaft 53 serves as the pivot point for the arm 6 attached to the base 4.

To allow the arm 6 to rotate about the base 4, the central shaft 53 receives bearings 54 and 56. A collar 62 receives races 58 and 60 that cooperate with the bearings 54 and 56 and serves as the mounting point for the arm 6. The collar 62 is thus free to rotate around the central shaft 53.

A mounting bracket 70 is secured to the collar 62 by fasteners 72 such as bolts. The mounting bracket 70 functions to secure the arm 6 to the collar 62 and has a channel 74 for receiving the inner end 7 of the arm 6. The arm 6 is mounted in the mounting bracket 70 such that it is in a generally horizontal position, and is secured in the mounting bracket 70 by bolts or by welding. The arm 6 is thus secured to the base 4 and allowed to rotate about the base 4 due to the pivotal connection 8.

The inner end of the arm 6 consists of an outer fixed member 80 and the suspended end 10 consists of an inner sliding member 100, which is slidably received into the fixed member 80. The fixed member 80 is an elongate box with a rectangular cross section to provide a rectangular opening 82 through the length of the fixed member 80 between opposite end faces 200, 202. For

descriptive purposes, the end 200 of the fixed member 80 receiving the sliding member 100 will be referred to as the front end 200 of the fixed member 80, and opposite end 202 will be referred to as the back end 202 of the fixed member 80. The fixed member 80 is received and secured in the channel 74 of the mounting bracket 70 and is oriented such that the short side of the rectangle is positioned horizontally and the long side of the rectangle is positioned vertically.

One end of the sliding member 100 is received into the interior 82 of the fixed member 80 through the opening at the front end 200. For descriptive purposes, the end 204 of the sliding member 100 received into the fixed member 80 will referred to as the back end 204 of the sliding member 100. The front end 206 of the sliding member 100 projecting from the fixed member 80 supports the seat assembly 12. The sliding member 100 of the present embodiment is a solid bar with a rectangular cross section.

To allow the sliding member 100 to slide within the fixed member 80, a series of roller bearings 84, 86, 90 and 92 are mounted inside the fixed member 80 to provide both lateral and vertical guidance to the sliding member 100. The roller bearings 84, 86, 90 and 92 are mounted near the front opening 200 of the fixed member 80, thus allowing a greater length of travel of the sliding member 100 over the roller bearings 84, 86, 90 and 92. The roller bearings 84, 86, 90 and 92 include wheels 180 having a central hole 182. A bearing bolt 184 having a smooth cylindrical portion 185 between a head 186 and a threaded portion 187 is used to secure the wheel 180 to the fixed member 80. The smooth cylindrical portion 185 is positioned through the hole 182 in the wheel 180 and allows the wheel 180 to rotate. To provide vertical guidance to the sliding member 100, a pair of roller bearings 84 are mounted inside the fixed member 80 near the top and a pair of roller bearings 86 are mounted inside the fixed member 80 near the bottom. The roller bearings 84, 86 are attached by pairs of aligned holes through the sides of the fixed member 80 through which the bearing bolt 184 is passed, and secured by a nut onto the threaded portion 187. To provide lateral guidance, a pair of roller bearings 90 and 92 are mounted on either side of the fixed member 80. The roller bearings 90 and 92 are mounted by cutting a slot through the side of the fixed member 80 into which the wheel bearing 180 is fitted. Mounting brackets 188 are then affixed to side of the fixed member 80 by bolts 189 and the wheel 180 are

attached to the mounting brackets 188 by bearing bolts 184. The sliding member 100 is supported and guided on the roller bearings 84, 86, 90 and 92 mounted in the fixed member 80, and thus allows the sliding member 100 to extend and retract into the fixed member 80.

A stop 102 is installed to inhibit the sliding member 100 from being extended beyond an extreme position and loosing contact with the roller bearings 84, 86, 90, 92. The stop 102 consists of a plate 103 affixed to the back end 204 of the sliding member 100. The plate 103 overlaps the back end 204 of the sliding member 100, and thus extends past the top and bottom of the back end 204 of the sliding member 100. However, the length of the plate 103 is less than the height of the rectangular opening 82 of the fixed member 80, and thus the sliding member 100 is free to move within the rectangular opening 82 of the fixed member 80.

Stop screws 98 are inserted into the top and bottom of the fixed member 80 behind the roller bearings 84, 86, 90 and 92. The screws 98 extend through the wall of the fixed member 80 and into the rectangular opening 82. The screws 98 interact with the plate 103 thereby inhibiting the back end 204 of the sliding member 100 from travelling past the screws 98. The screws 98 have a rubber coating to cushion the interaction between the screw 98 and the plate 103. To prevent the sliding member 100 from entering too far into the fixed member 80, a bar 108 is attached to the front end 206 of the sliding member 100. The bar 108 is wider than the opening at the front end 200 of the fixed member 80. The bar 108 is also coated with rubber to cushion the impact between the bar 108 and the opening at the front end 200 of the fixed member 80.

Once the sliding member 100 has been positioned into the fixed member 80, the openings at the ends 200, 202 of the fixed member 80 may be sealed to prevent accumulation of dust or potentially harmful microorganisms. To seal the opening at the back 202 of the fixed member 80, a cap 91 may be fitted over the opening and secured by a screw 291. To seal the opening at the front 202 of the fixed member 80, a skirt 94 with accordion pleats is fitted over the sliding member 100. One end of the skirt 94 is attached to the front end 200 of the fixed member 80 thus covering the opening. The opposite end of the skirt 94 is attached to the front end 206 of the

sliding member 100. The accordion pleats of the skirt 94 accommodate extension and retraction of the sliding member 100 relative to the fixed member 80.

A cylinder 104 is attached to the front end 206 of the sliding member 100. The brake 14 is attached to the sliding member 100 on the cylinder 104. The brake consists of a foot 110 that may be extended from the cylinder 104 to engage the floor 20. The foot 110 is a hollow tube 110 with the interior diameter of the hollow tube 110 larger that the exterior diameter of the cylinder 104. The foot 110 is fitted over the cylinder 104 and attached to the cylinder by a spring 118. The spring 118 is situated in the interior of the foot 110 and the interior of the cylinder 104 and is attached to the foot 110 and cylinder 104 by attachments means 120 and 122 such as screws. The spring 118 is attached in an extended state, whereby tension from the spring 118 lifts the foot 110 above the floor 20. The foot 110 further has a longitudinal slot 111 through which the screw 120 attaches to the spring 118. The tension of the spring 118 may be increased or decreased by moving the screw 120 to a lower or higher position along the slot 111. The bottom of the foot 110 carries a boot 112, which contacts the floor 20. The boot 112 is disc shaped and composed of a rubber material and fits on the end of the foot 110. The boot 112 provides frictional contact between the foot 110 and the floor 20 and inhibits the foot 110 from slipping on the floor 20.

The brake 14 is deployed by a lever 106 that pushes the foot 110 such that the foot 110 is lowered and the boot 112 contacts the floor 20. The lever 106 is a generally "U" shaped member having a closed circular end 162 and two substantially parallel ends 164. The two parallel ends 164 are vertically displaced from the closed circular end 162. The lever 106 is attached to the cylinder 104 by a pivotal attachment 116 such as a bolt that serves as the fulcrum for the lever 106. The closed circular end 162 of the lever 106 engages the foot 110 through a lip 124 on the top of the foot 110. The two parallel ends 164 of the lever 106 are attached to a pair of brake wires 250. The brake wires 250 are part of the brake cord 109. The brake cord 109 consists of an inner brake wire 250 and an outer sleeve 252. The brake wire 250 is slidable within the outer sleeve 252. The outer sleeve 252 is secured to the bar 108 while the brake wire 250 passes through a hole in the bar 108 to connect to the end 164 of the lever 106.

To activate the brake 14, the brake wire 250 attached to the two parallel ends 164 of the lever 106 is pulled, which raises the two parallel ends 164 and results in the lever 106 tilting at the fulcrum 106. The closed circular end 162 of the lever 106 engages the lip 124 of the foot 110 and pushes the foot 110 toward the floor 20. Contact of the boot 112 with the floor 20 inhibits the rotational of the arm 6 and the horizontal movement of the sliding member 100, and provides vertical support for the suspended end 10.

The seat assembly 12 of the chair 1 is attached to the suspended end 10 of the arm 6. The seat assembly 12 is mounted on a gas cylinder 130 attached to the cylinder 104 at the front end 206 of the sliding member 100. The gas cylinder 130 allows the height of the seat assembly 12 to be adjusted. Such gas cylinders 130 are known in the art and many office chairs employ such devises. To raise the height of the seat assembly 12, the operator stands to remove their weight from the seat assembly 12 and presses a lever 140 shown in figure 5 connected to the gas cylinder 130 which opens an air valve to the gas cylinder 130. A compressed spring within the gas cylinder 130 raises the seat and the open air valve allows air to enter the gas cylinder 130. To lower the seat assembly 12, the operator sits in the seat assembly 12 and presses the lever 140 that opens the air valve to the cylinder 130. The weight of the operator in the seat assembly 12 compresses the spring in the gas cylinder 130 and the open air valve allows air to escape from the gas cylinder 130, thus lowering the seat assembly 12. Various methods of raising and lowering the seat are known in the art and may also be used, including the use of electric motors, hydraulic pumps and the like. In an alternated embodiment, the seat assembly 12 may be mounted on a rigid pole or post such that the seat assembly 12 is not height adjustable.

The seat assembly 12 is composed of a seat base 150, which is rotatably attached to the gas cylinder 130. The seat base 150 serves as a platform for the attachment of various components of the seat assembly 12. A seat bottom 131 is attached to the seat base 150 by a pivotal attachment allowing the seat bottom 131 to pivot from a resting position to a forward tilt position. A pair of holes 152 through the sides of the seat base 150 aligns with a complementary pair of holes 136 in the sides of the seat bottom 131 and serve as a pivot point 152 for tilting the seat bottom 131 relative to the seat base 150. A fastener 138, such as a bolt having a smooth

cylindrical section connecting the head to the threaded section, is secured through the aligned holes 152, 136 and thus connecting the seat bottom 131 to the seat base 150. A notch 151 cut out of the front of the seat base 150 aligns with a notch 133 cut out of the front of the seat bottom 131. The notches 133 and 151 allow the seat bottom 131 to tilt forward at the pivotal attachment point 152.

A pair of brake wires 250 are secured to the back of the seat bottom 131. The outer sleeves 252 of the brake cords 109 are connected to a bar 254 secured to the back of the seat base 150. The brake wires 250 pass through holes in the bar 254 to the seat bottom 131. The brake wire 250 is thus secured to the back of the seat bottom 131 and the two parallel ends 164 of the lever 106. Securing the outer sleeve 252 of the brake cords 109 to the seat base 150 and the bar 108 allows the brake cords 109 to accommodate rotation and height adjustments of the seat assembly 12 while maintaining a constant amount of tension in the brake wires 250.

The brake 14 is activated by the operator leaning forward in the seat assembly 12. This action results on the seat bottom 131 tilting forward, and thus pulling on the brake wires 250 attached to the back of the seat bottom 131. The brake wires 250 raise the two parallel ends 164 of the lever 106 thereby resulting in the lever 106 pushing the foot 110 to the floor 20. When the operator leans back in the seat assembly 12, the seat bottom 131 pivots to the resting position, releasing the tension on the brake wires 250 and allowing the spring 118 to raise the foot 110 from the floor 20.

A padded cushion 132 is attached to the seat bottom 131 by a threaded fastener. A backrest 134 is attached to the back of the seat bottom 131. The backrest 134 consists of a generally "L" shaped tubular member 230 attached to the seat bottom 131 by a releasable threaded fastener 234. The releasable fastener 234 allows the lateral position of the backrest 134 relative to the seat bottom 131 to be adjusted by the operator. A generally circular back support 232 is attached to the tubular member 230 by a releasable threaded fastener 236. The use of a releasable fastener 236 allows the height of the back support 232 relative to the seat bottom 131 to be adjusted by the operator.

A pair of tongues 154 extend from the front of the seat base 150 and serve as an attachment site for a knee rest 136. The knee rest 139 consists of a positioning rod 235 attached to the pair of tongues 154. An attachment between the positioning rod 235 and the pair of tongues 154 is by a spacer element 170 which is inserted through the positioning rod 235 and between the pair of tongues 154. The spacer element 170 is internally threaded and receives a pair of screws 172. The angle of the knee rest 139 relative to the seat base 150 may be altered by the operator loosening the screws 172, adjusting the angle of the positioning rod 235 and then tightening the screws 172. The knee rest 139 may also be removed from the seat assembly 12 by removing the screws 172 and removing the positioning rod 235. The positioning rod 235 is further attached to a kneepad 238. The kneepad 238 is generally a bent "T" shape and consists of a wide padded surface 240 for supporting the knees connected to an arm 242 for engaging the positioning rod 235. A releasable fastener, such as a screw 246, passes through a hole in the positioning rod 236 and into a longitudinal channel 244 in the narrow arm 242. Securing the fastener at different locations along the longitudinal channel 244 alters the distance between the kneepad 238 and the seat base 150.

In the present embodiment, energy to power the lateral and rotational movement of the arm 6 of the chair 1 is provided by the muscular power of operator. When the operator is seated in the seat and desires to move the seat to the left, the operator pushes with his feet against the floor 20 to the right. The arm 6 rotates on the pivotal connection to the left. If the operator desires to move forward, he uses his feet to exert a force backward or in the direction of the base, causing the sliding member 100 to extend from the fixed member 80. Once the seat is in the desired location, the operator leans forward, thus operating the lever 106 which lowers the foot 110 until the boot 112 contacts the floor 20.

Alternately, the arm 6 of the chair 1 may be extended and rotated through the use of electric motors in the chair 1. For example, a screw drive system may be installed wherein a screw is attached to the fixed member 80 and the screw is mated with a threaded collar attached to the sliding member 100. An electric motor then reversibly rotates the screw, resulting in the

extension or retraction of the sliding member 100 relative to the fixed member 80. A similar mechanism may be employed to raise and lower the seat assembly 12. The arm 6 may be rotated about the pivotal connection 8 by an electric motor through gears or belts attached to the central shaft 53. Alternatively, hydraulic pistons may power the extension and retraction of the arm 6, raising and lowering the seat assembly 12, and rotation of the arm 6 about the base 4. In such embodiments wherein electric or hydraulic methods are used to power the movement of the chair 1, the stop 14 may be the friction of the electric motor or hydraulic pistons when not in use.

Although the present embodiment has been described with a telescoping arm having a fixed member 80 and a sliding member 100, other telescoping arms having more than one sliding member 100 may also be used. The present invention is not limited to a cantilever arm 6 having a telescoping movement to achieve lateral movement relative to the base 4. The suspended end 10 of the arm 6 may also be displaced from the base 4 by mechanisms known in the art such as an articulating arm or a sliding arm. Another motion to displace the suspended end 10 of the arm 6 is by a scissors motion wherein two section of the arm 6 are connected by an elbow joint.

Although the brake 14 of the present embodiment is deployed by a lever 106, the brake 14 may also be extended by an electrical or hydraulic mechanism activated by the operator. Alternatively, the brake 14 may not extend from the arm 6, but the arm 6 may tilt at the pivotal connection 8 or the arm 6 may bend along its length thereby allowing the brake 14 to contact the floor 20. The present invention is not limited to the brake 14 being positioned at the front end 206 of the sliding member 80. The brake 14 may be positioned at other points along the arm 6, for example the brake 14 may be placed on the fixed member 80.

In an alternate embodiment, the brake 14 may not contact the ground but may inhibit movement of the arm 6 by a different mechanism. A series of brakes may be installed in the arm 6 to inhibit the rotation of the roller bearings 84, 86, 90 and 92, and the brakes may be activated by electromagnetic energy. Brakes may also be installed in the pivotal connection 8 to inhibit rotation of the arm 6 about the base 4. Alternately, in an example described below wherein the

movement of the arm 6 is activated by electric motors, the electric motors may function as a brake 14 and inhibit the horizontal and rotational movement of the arm 6.

A variety of different types of seats 12 are known in the art and may be used with the present invention. The seat assembly 12 may be a simple platform for the operator to sit upon. Alternatively, the seat may be an attachment point to secure a platform for the operator to sit upon.

Although the invention has been described with reference to certain specific embodiments, various modifications thereof will be apparent to those skilled in the art without departing from the spirit and scope of the invention as outlined in the claims appended hereto.